

ENVIRONMENTAL

RADIATION

DATA

REPORT 122

April - June 2005

United States Environmental Protection Agency

Office of Radiation and Indoor Air

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Preface

Environmental Radiation Data (ERD) is compiled and published quarterly by the Office of Radiation and Indoor Air's National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, and contains data from the RadNet monitoring system (formerly ERAMS). ERD is published in both hard-copy and electronic formats. Electronic reports are available online at www.epa.gov/narel.

The United States Environmental Protection Agency established RadNet in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. RadNet is comprised of a nationwide network of sampling stations that provide air particulate, precipitation, drinking water, and milk samples.

Sampling locations are selected to provide population and geographic coverage for the United States. The radiation analyses performed on these samples include gross alpha and gross beta analysis, gamma analyses, and radionuclide-specific analyses for uranium, plutonium, strontium, iodine, radium, and tritium. This monitoring effort also provides ancillary information on natural background levels and on routine and accidental releases into the environment from stationary sources.

The radiochemical procedures used by NAREL to analyze the RadNet samples are contained in the *NAREL Radiochemistry Procedures Manual*. Station operation and sample collection are in accordance with procedures contained in the *ERAMS Manual* (EPA 520/5-84-007, 008, 009).

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Acknowledgments

All sampling for the RadNet monitoring system (formerly ERAMS) is performed by volunteer collectors who are frequently members of health departments or related environmental agencies of their respective states. The National Air and Radiation Environmental Laboratory (NAREL), on behalf of the U.S. Environmental Protection Agency, would like to acknowledge the time and effort of these volunteer collectors, who are so essential to the successful operation of RadNet. The efforts of the sample collectors are especially appreciated during times of emergency operation when sampling frequencies are increased and schedules are sometimes demanding.

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Data Reporting Conventions

Every laboratory measurement involves uncertainty. When there is little or no radioactivity in a sample, one consequence of measurement uncertainty is the possibility of obtaining a measured value that is less than zero. Such a negative result occurs when random effects in the measurement process cause the measured value for the sample to be less than that of the blank or background, which is subtracted from it. From April 1991 to December 1995, negative results were reported as “not detected” or “ND,” and gamma analysis results that were less than their estimated measurement uncertainties were also reported as “ND.” In January 1996, both of these practices were discontinued. Although negative activities are physically impossible, the inclusion of negative results in the report allows better statistical analysis of the data.

Results of gamma analyses are still reported as “ND” when gamma-emitting radionuclides are not detected.

Measurement Uncertainty

Each measured value y is reported with an expanded uncertainty $U = k u_c(y)$, which is determined from the combined standard uncertainty $u_c(y)$ and the coverage factor $k = 2$. The interval from $y - U$ to $y + U$ is estimated to have a level of confidence of approximately 95%.

Significant Figures

Expanded uncertainties are reported to two significant figures. Measurement results are rounded to the corresponding number of decimal places.

Detection Capability

The minimum detectable concentrations (MDCs) for each radionuclide are shown in Table 1. The MDC is defined as the minimum concentration that gives a 95% probability of detection when the detection criteria are chosen to give only a 5% probability of false detection in a blank sample.

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Table 1**Reporting Units and Minimum Detectable Concentrations
for Radionuclide Analyses**

Radionuclide	Media	Reporting Unit	Minimum Detectable Concentration
Gross Alpha	Water	pCi/L	2
Gross Beta	Air	pCi/m ³	0.0015
	Water	pCi/L	2
	Precipitation	pCi/L	2
Tritium	Water	pCi/L	150
	Milk	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m ³	0.75
	Water	pCi/L	0.1
† Uranium-234,235,238	Air	aCi/m ³	0.75
	Water	pCi/L	0.1
Radium-226	Water	pCi/L	0.02
Strontium-90	Milk	pCi/L	2
	Water	pCi/L	1
‡ Iodine-131	Milk (gamma)	pCi/L	4
	Water (gamma)	pCi/L	4
	Water	pCi/L	0.3
Cesium-137	Milk	pCi/L	5
	Water	pCi/L	5
‡ Barium-140	Milk	pCi/L	15
	Water	pCi/L	15
Potassium	Milk	g/L	0.06
	Water	g/L	0.06
Potassium-40	Water	pCi/L	50

* The MDC for air is based on an assumed total sample volume of 120,000 m³. Measurement by alpha spectrometry includes combined activities of ²³⁹Pu and ²⁴⁰Pu, since the relative contributions of these two isotopes cannot be determined.

† The MDC for air is based on an assumed total sample volume of 120,000 m³.

‡ Activity as of the day of counting.

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1. Air Program

Airborne Particulates and Precipitation

Gross beta radioactivity measurements and certain specific analyses are performed on air particulates and precipitation samples as indicator measurements in assessing the general (national) impact of all contributing sources on environmental levels of radiation. Airborne particulates are collected continuously at field stations representing wide geographic coverage throughout the United States.

Filters (10-cm diameter synthetic fiber) from air samplers are changed twice weekly and field measurements are made with a G-M survey meter 5 hours after collection to allow natural radon isotopes and their progeny to decay. Field estimates are reported to appropriate EPA officials by telephone or mail depending on the activity levels found.

The filters are sent to NAREL for more sensitive analysis in a low background beta counter. Gamma scans are performed on all filters showing gross beta activity greater than 1 pCi/m³. The laboratory obtained values are usually lower than the field estimates because of the decay of naturally occurring radionuclides during the time between the two measurements.

Precipitation samples are collected at most field stations that collect air filters. These samples are also sent to NAREL where they are composited monthly for gamma scans, tritium, and gross beta activity measurements.

A compilation of individual measurements is available from the National Air and Radiation Environmental Laboratory, 540 South Morris Avenue, Montgomery, AL 36115-2601.

Table 2
Gross Beta in Airborne Particulates
April 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AL: Montgomery/408	8	0.3	0.0	0.1	0.010	0.006	0.008
AR: Little Rock	5	0.1	0.0	0.0	0.013	0.008	0.010
AZ: Phoenix	3	0.5	0.3	0.4	0.017	0.010	0.013
CA: Los Angeles	7	0.4	0.1	0.3	0.013	0.007	0.009
CA: Richmond	4	0.0	0.0	0.0	0.004	0.003	0.004
CO: Denver	6	0.9	0.6	0.7	0.015	0.006	0.011
CT: Hartford	9	0.2	0.0	0.1	0.008	0.002	0.005
DC: Washington	8	0.1	0.0	0.1	0.016	0.003	0.008
DE: Wilmington	9	0.3	0.0	0.1	0.014	0.003	0.008
FL: Jacksonville	9	0.8	0.1	0.1	0.013	0.006	0.009
FL: Miami	5	0.0	0.0	0.0	0.012	0.007	0.009
HI: Honolulu	5	0.1	0.0	0.0	0.007	0.002	0.005
IA: Iowa City	8	0.7	0.1	0.4	0.017	0.006	0.010
ID: Idaho Falls	8				0.010	0.004	0.007
IL: Chicago	8	0.5	0.1	0.2	0.018	0.008	0.011
IN: Indianapolis	9	0.4	0.1	0.2	0.010	0.005	0.007
KS: Kansas City	4	2.9	0.4	1.3	0.010	0.006	0.008
KS: Topeka	2	2.0	1.0	1.5	0.016	0.012	0.014
ME: Augusta	2	0.0	0.0	0.0	0.008	0.005	0.006
MI: Detroit	8	4.1	0.2	1.2	0.020	0.006	0.010
MI: Lansing	8	0.4	0.1	0.2	0.014	0.007	0.010
MN: Minneapolis	4	0.2	0.1	0.2	0.015	0.011	0.014
MS: Jackson	7	0.1	0.0	0.0	0.012	0.007	0.009
NC: Charlotte	9	0.1	0.0	0.0	0.019	0.006	0.011
NC: Wilmington	2				0.011	0.007	0.009
ND: Bismarck	9	1.4	0.0	0.8	0.015	0.008	0.011
NH: Concord	8	0.2	0.1	0.1	0.008	0.003	0.005
NJ: Trenton	6	0.4	0.1	0.2	0.014	0.003	0.008
NM: Santa Fe	2	0.4	0.1	0.2	0.008	0.005	0.006
NV: Las Vegas/913	5	0.1	-0.0	0.0	0.010	0.005	0.007
NY: Albany	4	0.1	0.0	0.1	0.010	0.005	0.008
NY: New York City	9	0.1	0.0	0.0	0.025	0.007	0.012
NY: Yaphank	5	0.1	0.0	0.0	0.007	0.003	0.005
OH: Painesville	6	0.2	0.1	0.1	0.012	0.005	0.008
OH: Ross	9				0.027	0.005	0.010
OR: Portland	9	0.0	0.0	0.0	0.007	0.002	0.004
PA: Harrisburg	8	0.4	0.0	0.2	0.016	0.003	0.009
PA: Philadelphia	7	0.1	0.0	0.0	0.011	0.005	0.008

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
PA: Pittsburgh	8	0.3	0.0	0.1	0.013	0.003	0.009
SC: Barnwell	1	0.0	0.0	0.0	0.009	0.009	0.009
SC: Columbia	3	0.1	0.0	0.0	0.033	0.007	0.017
SD: Pierre	8	0.5	0.2	0.3	0.013	0.006	0.009
TN: Knoxville	4	0.0	0.0	0.0	0.024	0.010	0.015
TN: Nashville	8	0.2	0.0	0.1	0.015	0.007	0.010
TN: Oak Ridge/Bethel	8	0.4	0.1	0.2	0.017	0.006	0.010
TN: Oak Ridge/K25	8	0.7	0.2	0.4	0.020	0.006	0.010
TN: Oak Ridge/Melton	8	0.6	0.1	0.3	0.015	0.005	0.009
TN: Oak Ridge/Y12 E	8	0.6	0.1	0.3	0.018	0.007	0.010
TN: Oak Ridge/Y12 W	8	0.2	0.1	0.2	0.019	0.007	0.011
TX: Austin	8	0.1	0.0	0.1	0.010	0.007	0.009
TX: Dallas	9	0.5	0.2	0.3	0.014	0.008	0.011
TX: El Paso	9	1.0	0.3	0.6	0.018	0.007	0.011
UT: Salt Lake City	8	0.2	0.0	0.1	0.009	0.004	0.007
VA: Lynchburg	8	0.8	0.0	0.2	0.014	0.005	0.008
WA: Olympia	6	0.1	0.0	0.0	0.005	0.002	0.003
WA: Spokane	9	0.6	0.1	0.3	0.011	0.003	0.007

Table 3
Gross Beta in Airborne Particulates
May 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AK: Anchorage	1	0.0	0.0	0.0	0.010	0.010	0.010
AL: Montgomery/408	9	0.3	0.1	0.2	0.012	0.006	0.009
AR: Little Rock	7	0.0	0.0	0.0	0.014	0.008	0.011
AZ: Phoenix	5	0.5	0.2	0.3	0.013	0.008	0.011
CA: Los Angeles	9	0.3	0.1	0.2	0.012	0.004	0.008
CA: Richmond	5	0.0	0.0	0.0	0.005	0.003	0.004
CO: Denver	9	1.6	0.1	0.7	0.011	0.006	0.008
CT: Hartford	9	0.1	0.0	0.1	0.006	0.001	0.004
DC: Washington	9	0.1	0.0	0.0	0.009	0.002	0.006
DE: Wilmington	9	0.3	0.1	0.2	0.011	0.003	0.007
FL: Jacksonville	9	0.1	0.1	0.1	0.010	0.005	0.008
FL: Miami	1	0.0	0.0	0.0	0.011	0.011	0.011
GA: Atlanta	3	0.2	0.0	0.1	0.014	0.006	0.010
HI: Honolulu	8	0.1	0.0	0.1	0.010	0.002	0.005
IA: Iowa City	9	0.7	0.1	0.4	0.015	0.005	0.009
ID: Idaho Falls	9				0.009	0.004	0.007
IL: Chicago	8	0.6	0.0	0.3	0.022	0.006	0.012
IN: Indianapolis	9	0.8	0.1	0.3	0.014	0.004	0.008
KS: Topeka	5	2.5	0.5	1.3	0.014	0.009	0.012
ME: Augusta	3	0.1	0.0	0.0	0.006	0.001	0.004
MI: Detroit	9	1.8	0.1	0.7	0.019	0.004	0.009
MI: Lansing	9	0.3	0.0	0.2	0.018	0.004	0.009
MN: Minneapolis	4	0.2	0.2	0.2	0.012	0.009	0.011
MS: Jackson	9	0.6	0.0	0.1	0.015	0.009	0.012
NC: Charlotte	9	0.1	0.0	0.0	0.019	0.005	0.012
ND: Bismarck	7	1.9	0.5	1.0	0.018	0.006	0.011
NH: Concord	9	0.3	0.0	0.1	0.008	0.001	0.004
NJ: Trenton	9	0.4	0.1	0.2	0.010	0.001	0.006
NM: Santa Fe	3	2.3	0.3	1.2	0.007	0.005	0.007
NV: Las Vegas/913	4	0.0	0.0	0.0	0.007	0.004	0.005
NY: Albany	4	0.1	0.0	0.1	0.007	0.003	0.006
NY: New York City	8	0.5	0.0	0.1	0.013	0.002	0.009
NY: Yaphank	7	0.1	0.0	0.1	0.007	0.001	0.003
OH: Painesville	7	0.3	0.1	0.2	0.014	0.006	0.009
OH: Ross	9				0.018	0.003	0.011
ON: Ottawa	3	0.1	0.0	0.1	0.004	0.002	0.003
OR: Portland	9	0.1	0.0	0.0	0.007	0.002	0.004
PA: Harrisburg	9	0.3	0.1	0.2	0.013	0.003	0.008

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
PA: Philadelphia	8	0.1	0.0	0.0	0.009	0.002	0.006
PA: Pittsburgh	8	0.2	0.1	0.1	0.018	0.005	0.009
SC: Columbia	3	0.1	0.0	0.1	0.014	0.009	0.011
SD: Pierre	7	0.3	0.1	0.2	0.012	0.005	0.008
TN: Knoxville	7	0.0	0.0	0.0	0.020	0.006	0.013
TN: Nashville	9	0.4	0.1	0.2	0.018	0.005	0.012
TN: Oak Ridge/Bethel	7	0.8	0.2	0.4	0.016	0.005	0.012
TN: Oak Ridge/K25	7	1.0	0.2	0.6	0.020	0.007	0.012
TN: Oak Ridge/Melton	7	0.6	0.2	0.4	0.017	0.006	0.011
TN: Oak Ridge/Y12 E	7	0.9	0.1	0.4	0.019	0.006	0.013
TN: Oak Ridge/Y12 W	7	0.3	0.1	0.2	0.018	0.006	0.012
TX: Austin	9	0.1	0.0	0.0	0.016	0.010	0.014
TX: Dallas	9	0.4	0.1	0.3	0.020	0.007	0.014
TX: El Paso	9	0.8	0.3	0.5	0.014	0.009	0.011
UT: Salt Lake City	8	0.2	0.0	0.1	0.010	0.003	0.007
VA: Lynchburg	7	0.6	0.1	0.4	0.011	0.006	0.008
WA: Olympia	9	0.1	0.0	0.0	0.007	0.002	0.004
WA: Spokane	8	0.4	0.1	0.2	0.013	0.004	0.008

Table 4
Gross Beta in Airborne Particulates
June 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AL: Montgomery/408	9	0.6	0.1	0.2	0.018	0.003	0.008
AR: Little Rock	6	0.1	0.0	0.0	0.028	0.008	0.013
AZ: Phoenix	4	0.4	0.2	0.3	0.016	0.010	0.013
CA: Los Angeles	8	0.3	0.2	0.2	0.009	0.004	0.007
CA: Richmond	4	0.0	0.0	0.0	0.004	0.002	0.003
CO: Denver	9	1.5	0.2	0.9	0.023	0.004	0.011
CT: Hartford	8	0.1	0.0	0.1	0.012	0.003	0.007
DC: Washington	9	0.1	0.0	0.1	0.011	0.004	0.007
DE: Wilmington	9	0.3	0.1	0.2	0.010	0.003	0.007
FL: Jacksonville	8	0.1	0.0	0.1	0.007	0.003	0.006
GA: Atlanta	4	0.0	0.0	0.0	0.014	0.005	0.008
HI: Honolulu	6	0.1	0.0	0.1	0.004	0.002	0.003
IA: Iowa City	9	1.1	0.1	0.4	0.020	0.004	0.010
ID: Idaho Falls	9				0.013	0.005	0.008
IL: Chicago	7	2.0	0.1	0.5	0.071	0.007	0.021
IN: Indianapolis	8	0.4	0.1	0.3	0.017	0.003	0.008
KS: Topeka	7	2.3	0.1	1.1	0.029	0.006	0.015
ME: Augusta	1	0.0	0.0	0.0	0.006	0.006	0.006
MI: Detroit	7	2.3	0.4	1.3	0.014	0.002	0.008
MI: Lansing	9	0.4	0.1	0.2	0.021	0.002	0.011
MN: Minneapolis	5	0.2	0.1	0.1	0.015	0.006	0.010
MS: Jackson	8	0.8	0.0	0.2	0.020	0.005	0.010
NC: Charlotte	8	0.1	0.0	0.0	0.015	0.007	0.011
ND: Bismarck	6	0.6	0.0	0.4	0.011	0.005	0.008
NH: Concord	8	0.6	0.0	0.2	0.016	0.002	0.007
NJ: Trenton	9	0.4	0.1	0.2	0.011	0.003	0.007
NM: Santa Fe	3	2.0	0.3	1.2	0.008	0.006	0.007
NV: Las Vegas/913	4	0.1	0.0	0.0	0.006	0.004	0.005
NY: Albany	5	0.1	0.0	0.0	0.011	0.004	0.008
NY: New York City	8	0.1	0.0	0.0	0.014	0.004	0.009
NY: Yaphank	9	0.1	0.0	0.0	0.008	0.001	0.004
OH: Painesville	7	0.4	0.1	0.2	0.012	0.003	0.008
OH: Ross	8				0.019	0.004	0.011
ON: Ottawa	4	1.5	0.0	0.4	0.006	0.001	0.004
OR: Portland	8	0.1	0.0	0.0	0.003	0.002	0.002
PA: Harrisburg	8	0.4	0.2	0.3	0.015	0.004	0.009
PA: Philadelphia	4	0.1	0.0	0.0	0.007	0.005	0.006
PA: Pittsburgh	8	0.3	0.1	0.2	0.018	0.003	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
SC: Columbia	4	0.2	0.0	0.1	0.012	0.007	0.009
SD: Pierre	9	0.3	0.1	0.2	0.010	0.005	0.008
TN: Knoxville	5	0.1	0.0	0.0	0.021	0.007	0.013
TN: Nashville	9	0.6	0.0	0.2	0.023	0.007	0.011
TN: Oak Ridge/Bethel	9	1.0	0.1	0.6	0.021	0.007	0.010
TN: Oak Ridge/K25	9	1.9	0.2	0.9	0.019	0.008	0.011
TN: Oak Ridge/Melton	9	1.4	0.1	0.7	0.019	0.006	0.009
TN: Oak Ridge/Y12 E	9	1.3	0.1	0.7	0.024	0.008	0.012
TN: Oak Ridge/Y12 W	9	0.8	0.1	0.4	0.020	0.007	0.011
TX: Austin	9	0.1	0.0	0.1	0.016	0.007	0.010
TX: Dallas	8	0.6	0.1	0.2	0.014	0.007	0.009
TX: El Paso	8	0.9	0.1	0.7	0.015	0.008	0.011
UT: Salt Lake City	7	0.5	0.0	0.2	0.013	0.005	0.007
VA: Lynchburg	9	1.2	0.2	0.6	0.013	0.005	0.008
WA: Olympia	8	0.0	0.0	0.0	0.003	0.001	0.002
WA: Spokane	7	0.3	0.1	0.2	0.010	0.004	0.006

Table 5
Gross Beta and Specific Gamma in Precipitation
April 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery/408	0.58	0.30		ND
AR: Little Rock	1.29	0.35	Pb212	6.1 4.9
			Tl208	1.8 3.3
AZ: Phoenix	3.36	0.50	Be7	24 21
CA: Richmond	0.33	0.29		ND
CO: Denver	4.79	0.55		ND
CT: Hartford	1.31	0.35	Be7	61 39
DE: Wilmington	1.41	0.37	K40	22 37
			Tl208	2.0 3.2
FL: Jacksonville	1.08	0.34	Be7	29 30
			Th227	7.7 6.8
			Tl208	3.6 3.4
HI: Honolulu	1.59	0.40	Pb212	5.0 6.2
IA: Iowa City	0.77	0.33		ND
ID: Idaho Falls	0.63	0.30	Bi212	30 41
KS: Kansas City	0.97	0.34	Be7	49 29
			K40	19 34
MA: Boston	2.11	0.39	Be7	64 27
			Pb212	6.4 6.1
ME: Augusta	1.01	0.33		ND
MI: Lansing	1.70	0.40		ND
MN: Minneapolis	2.95	0.45	Be7	54 31
NC: Charlotte	1.50	0.38	Be7	66 27
NC: Wilmington	0.64	0.30		ND
ND: Bismarck	1.33	0.35		ND
NH: Concord	1.32	0.35	Be7	61 23
NY: Albany	2.69	0.46	Be7	92 35
NY: Yaphank	0.72	0.32	Be7	31 26
OH: Painesville	1.75	0.37	Tl208	2.8 3.7
OR: Portland	0.81	0.30		ND
PA: Harrisburg	2.13	0.41	Be7	68 27
TN: Knoxville	18.3	1.0	Be7	35 29
			K40	36 37
	18.1	1.0	Be7	35 29
			K40	36 37
TN: Nashville	0.80	0.32	Be7	37.3 9.2
TN: Oak Ridge/Melton	1.48	0.36	Be7	75 35

Note: ND = Not Detected

Table 5 (continued)
Gross Beta and Specific Gamma in Precipitation
April 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
TX: Dallas	3.16	0.49	Be7	88 25
UT: Salt Lake City	1.22	0.34		ND
VA: Lynchburg	0.95	0.34	Pb212	6.0 4.9
			Ra224	44 38
WA: Olympia	0.74	0.30		ND

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
May 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2\sigma$		Nuclide	pCi/L $\pm 2\sigma$
AL: Montgomery/408	2.12	0.39	Be7	121 34
			K40	29 37
CA: Richmond	0.45	0.29		ND
CO: Denver	1.27	0.34	Pb212	5.2 6.3
CT: Hartford	1.18	0.33		ND
DE: Wilmington	0.56	0.29	Be7	31 27
			Pb212	2.8 4.2
FL: Jacksonville	1.06	0.34	Be7	61 30
GA: Atlanta	3.02	0.43	Be7	139 32
			Pb212	5.1 5.9
IA: Iowa City	1.34	0.36		ND
MA: Boston	0.79	0.30	Be7	26 23
ME: Augusta	1.13	0.32	Be7	35 30
MI: Lansing	1.43	0.38	Be7	33 27
MN: Minneapolis	1.53	0.37	Be7	77 32
			Pb212	4.0 5.9
NC: Charlotte	1.71	0.37	Be7	63 10
NC: Wilmington	1.13	0.33	Be7	52 22
ND: Bismarck	1.04	0.34		ND
NH: Concord	0.71	0.29	Be7	59 23
NY: Albany	2.65	0.43	Be7	40 34
NY: Yaphank	1.11	0.32		ND
OH: Painesville	1.46	0.37	Be7	42 30
OR: Portland	0.67	0.31		ND
PA: Harrisburg	5.13	0.54	Be7	88 28
TN: Knoxville	6.39	0.62		ND
TN: Nashville	1.01	0.32	Be7	33 28
			Bi212	30 41
			Pb212	5.7 6.0
TN: Oak Ridge/Melton	2.94	0.44	Be7	48 32
			K40	38 36
			Pb212	3.7 5.8
TX: Austin	1.11	0.34		ND
TX: Dallas	1.03	0.35		ND
TX: El Paso	1.91	0.39	Be7	35 29
			Bi212	37 31
UT: Salt Lake City	1.16	0.35		ND

Note: ND = Not Detected

Table 6 (continued)
Gross Beta and Specific Gamma in Precipitation
May 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
VA: Lynchburg	4.79	0.54		ND
WA: Olympia	0.31	0.27	K40	23 29

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
June 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery/408	0.81	0.32	Be7	29 29
AR: Little Rock	2.22	0.44		ND
CA: Richmond	0.39	0.29		ND
CO: Denver	1.26	0.34	Be7	38 27
CT: Hartford	1.97	0.39	Be7	46 25
DE: Wilmington	1.61	0.39	Be7	23 20
FL: Jacksonville	0.56	0.29	Be7	26 23
			Pb212	3.0 4.5
			Tl208	2.9 3.6
GA: Atlanta	2.03	0.38	Be7	60 21
			Bi212	32 39
			Pb212	4.2 5.1
			Tl208	2.0 3.6
HI: Honolulu	2.79	0.46		ND
IA: Iowa City	1.03	0.34	Tl208	4.1 4.4
ID: Idaho Falls	1.27	0.35		ND
MA: Boston	5.56	0.58	Be7	55 23
MI: Lansing	2.08	0.41	Be7	24 24
MN: Minneapolis	1.27	0.36	Be7	64 32
NC: Charlotte	2.78	0.44	Be7	55 19
ND: Bismarck	1.19	0.35		ND
NH: Concord	1.65	0.36	Be7	37 25
NY: Albany	3.25	0.49	Be7	57 30
			K40	18 40
NY: Yaphank	24.6	1.2	Be7	23 23
			K40	35 37
OH: Painesville	0.74	0.30		ND
OR: Portland	1.52	0.36	Be7	47 25
PA: Harrisburg	3.15	0.46	Be7	72 34
			Tl208	2.8 4.4
TN: Knoxville	5.38	0.58	Tl208	2.2 3.5
TN: Nashville	1.04	0.36	Tl208	2.8 3.5
TN: Oak Ridge/Melton	3.51	0.48	Be7	51 29
			K40	24 38
			Tl208	2.7 3.5
TX: Austin	0.58	0.29		ND
TX: Dallas	0.74	0.30	Be7	24 20

Note: ND = Not Detected

Table 7 (continued)
Gross Beta and Specific Gamma in Precipitation
June 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
TX: Dallas	0.74	0.30	Bi212	44 45
			Tl208	3.6 3.8
UT: Salt Lake City	1.50	0.37	Be7	24 26
			Tl208	2.5 3.1
VA: Lynchburg	27.5	1.3		ND
WA: Olympia	0.62	0.30		ND

Note: ND = Not Detected

Table 8
Tritium in Precipitation
April - June 2005

Location	April 2005		May 2005		June 2005	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery/408	-9	82	8	86	75	80
AR: Little Rock	-5	84	NS		-85	80
AZ: Phoenix	-27	83	NS		NS	
CA: Richmond	-39	83	60	79	-54	82
CO: Denver	34	86	102	80	102	89
CT: Hartford	0	83	85	90	13	76
DE: Wilmington	58	85	-14	85	38	77
FL: Jacksonville	-7	83	-24	84	-27	74
GA: Atlanta	NS		0	85	36	78
HI: Honolulu	-23	83	NS		-82	81
IA: Iowa City	7	83	-62	82	-80	81
ID: Idaho Falls	44	86	NS		-56	83
KS: Kansas City	2	84	NS		NS	
MA: Boston	-18	82	-74	81	17	77
ME: Augusta	65	86	-66	82	NS	
MI: Lansing	60	85	20	86	-73	81
MN: Minneapolis	2	83	123	82	-42	82
NC: Charlotte	5	83	-10	84	-15	75
NC: Wilmington	30	84	-50	83	NS	
ND: Bismarck	34	86	80	80	-5	84
NH: Concord	14	84	-16	85	48	79
NY: Albany	37	85	-8	84	61	79
NY: Yaphank	25	84	-60	82	-6	75
OH: Painesville	118	88	-30	84	-42	83
OR: Portland	-49	82	103	81	-93	81
PA: Harrisburg	0	83	4	85	-19	75
TN: Knoxville	27	85	-28	84	2	76
TN: Nashville	14	83	-30	84	357	92
TN: Oak Ridge/Melton	114	88	114	90	90	89
TX: Austin	NS		53	78	-49	82
TX: Dallas	-67	81	67	79	-37	84
TX: El Paso	NS		111	80	NS	
UT: Salt Lake City	51	86	71	79	-26	83
VA: Lynchburg	54	84	4	85	-6	76
WA: Olympia	-55	82	87	80	-60	82

Note: NS = No Sample

Plutonium and Uranium in Airborne Particulates

Environmental radiation levels of plutonium and uranium are determined by the analysis of annually composited samples (air filters) collected from the continuously operating airborne particulate samplers.

Concentrations of plutonium-238, combined plutonium-239 and 240, and uranium-234, 235, and 238 are determined by alpha spectrometry following chemical separation. The volume of air represented by the annual composite typically ranges from 120,000 to 500,000 cubic meters.

Plutonium and uranium results are published when they become available.

Beta Activity in Precipitation

All stations routinely submit precipitation samples as rainfall, snow, or sleet occurs. The precipitation samples are composited at the NAREL into single monthly samples for each station. Each month that precipitation occurs, an aliquant of the composited sample is analyzed for gross beta, tritium, and gamma-emitting nuclides.

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2. Drinking Water Program

The RadNet drinking water program provides data on radionuclide concentrations in the nation's drinking water supplies. Samples are taken at 78 sites which are either major population centers or selected nuclear facility environs.

Drinking water data are used to assess trends and anomalies in concentrations, and to compare with standards set forth in the EPA "National Interim Primary Drinking Water Regulations." These regulations provide for approval of supplies when the combined radium-226 and radium-228 levels do not exceed 5 pCi/L, when the gross alpha (excluding radon and uranium) levels do not exceed 15 pCi/L, when tritium levels do not exceed 20,000 pCi/L, when the strontium-90 levels do not exceed 8 pCi/L, and when the gross beta levels do not exceed 50 pCi/L.

The analyses include (a) tritium on a quarterly basis; (b) gross alpha, gross beta, strontium-90, and gamma on annual composites; (c) radium-226 if the gross alpha exceeds 2 pCi/L and radium-228 if the radium-226 falls between 3 and 5 pCi/L; (d) iodine-131 on one quarterly sample per year for each station; and (e) an annual composite for plutonium-238, combined plutonium-239 and 240, and uranium-234, 235, and 238 for stations that demonstrate gross alpha levels greater than 2 pCi/L.

Table 9
Tritium in Drinking Water
April - June 2005

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	04/05/05	18	77
AL: Dothan	04/11/05	-61	81
AL: Montgomery/408	04/06/05	151	84
AL: Muscle Shoals	04/13/05	40	84
AL: Scottsboro	04/14/05	-33	81
AR: Little Rock	04/07/05	-37	82
CA: Los Angeles	04/04/05	50	79
CA: Richmond	05/03/05	12	79
CT: Hartford	04/05/05	-23	82
DE: Dover	04/13/05	14	83
FL: Tampa	06/16/05	169	83
GA: Baxley	04/27/05	64	82
GA: Savannah	05/11/05	12	84
HI: Honolulu	04/06/05	-32	80
IA: Cedar Rapids	04/05/05	34	85
ID: Boise	05/13/05	93	83
ID: Idaho Falls	04/08/05	5	83
IL: Morris	04/11/05	-21	82
IL: W. Chicago	04/06/05	-58	81
KS: Topeka	04/04/05	56	79
LA: New Orleans	05/13/05	80	82
MA: Lawrence	04/07/05	281	95
MD: Baltimore	04/05/05	70	81
MD: Conowingo	05/31/05	116	88
ME: Augusta	04/04/05	28	85
MI: Detroit	05/01/05	136	85
MI: Grand Rapids	04/05/05	100	82
MN: Minneapolis	04/18/05	0	82
MN: Red Wing	04/25/05	-12	82
MO: Jefferson City	04/04/05	68	80
MS: Jackson	04/05/05	36	79
MS: Port Gibson	04/05/05	48	80
MT: Helena	04/06/05	26	78
NC: Charlotte	04/13/05	392	98
NC: Raleigh	04/14/05	2	82
ND: Bismarck	04/04/05	158	85
NE: Lincoln	04/08/05	2	84
NH: Concord	04/04/05	54	79
NJ: Trenton	04/06/05	70	86
NJ: Waretown	04/11/05	-37	82

Table 9 (continued)
Tritium in Drinking Water
April - June 2005

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NM: Santa Fe	04/07/05	-47	81
NV: Las Vegas/906	06/16/05	33	77
NY: Albany	04/04/05	84	81
NY: New York City	04/14/05	-38	80
NY: Syracuse	06/20/05	132	81
OH: Cincinnati	05/09/05	42	80
OH: E. Liverpool	05/25/05	-12	83
OH: Painesville	05/31/05	-33	82
OH: Toledo	04/07/05	26	84
OK: Oklahoma City	04/22/05	-60	79
OR: Portland	04/25/05	77	82
PA: Columbia	06/01/05	-47	82
PA: Harrisburg	06/02/05	-14	83
PA: Philadelphia - Belmont Lab.	04/27/05	30	83
PA: Philadelphia - Queen Lane Lab.	04/27/05	79	83
PA: Philadelphia - Baxter Lab.	04/27/05	58	81
PA: Pittsburgh	05/25/05	-60	81
RI: Providence	05/24/05	52	79
SC: Barnwell	04/21/05	-5	79
SC: Columbia	04/29/05	114	84
SC: Jenkinsville	04/08/05	-30	82
SC: Seneca	04/05/05	12	77
TN: Chattanooga	04/05/05	312	91
TN: Knoxville	04/19/05	18	83
TN: Oak Ridge - Roane Co. #360	04/05/05	42	79
TN: Oak Ridge - Roane Co. #4442	04/05/05	293	91
TN: Oak Ridge - Anderson Co. #772	04/05/05	18	77
TN: Oak Ridge - Knox Co. #371	04/05/05	16	78
TN: Oak Ridge - Anderson Co. #768	04/05/05	50	80
TX: Austin	04/19/05	4	82
VA: Lynchburg	04/06/05	-37	82
WA: Richland	04/11/05	17	83
WA: Seattle	05/17/05	-70	80

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3. Milk Program

Pasteurized Milk

Milk is a reliable indicator of the general population's intake of certain radionuclides since it is consumed fresh by a large segment of the population and can contain several of the biologically significant radionuclides that result from environmental releases from nuclear activities. A primary function of this program is to obtain reliable monitoring data relative to current radionuclide concentrations and determine any long-term trends.

Quarterly samples are collected at approximately 55 sampling sites. The samples are composited, according to production, from the major milk suppliers representing more than 80 percent of the milk consumed in a given population center.

The samples are analyzed for gamma-emitting nuclides, including iodine-131, barium-140, cesium-137, and potassium-40. Total potassium concentrations in g/L are determined from potassium-40 activities assuming natural isotopic abundances. During the third quarter collection, one-fourth of the samples are also analyzed for strontium-90 on a four year rotating schedule.

Table 10
Radionuclides in Pasteurized Milk
April - June 2005

Location	Date Collected	K g/L $\pm 2u$		¹³⁷ Cs pCi/L $\pm 2u$	¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
AL: Montgomery	04/15/05	1.66	0.12	ND	ND	ND
AR: Little Rock	06/07/05	1.62	0.13	ND	ND	ND
AZ: Phoenix	06/21/05	1.63	0.12	ND	ND	ND
CA: Los Angeles	04/05/05	1.60	0.12	ND	ND	ND
CA: Sacramento	04/21/05	1.55	0.12	ND	ND	ND
CA: San Francisco	04/11/05	1.64	0.12	ND	ND	ND
CT: Hartford	04/21/05	1.56	0.13	ND	ND	ND
DE: Wilmington	04/20/05	1.57	0.12	ND	ND	ND
FL: Tampa	04/12/05	1.62	0.13	ND	ND	ND
IA: Des Moines	04/01/05	1.58	0.13	ND	ND	ND
IN: Indianapolis	04/25/05	1.57	0.12	ND	ND	ND
KS: Wichita	04/05/05	1.63	0.11	ND	ND	ND
KY: Louisville	04/13/05	1.62	0.12	ND	ND	ND
MA: Boston	06/15/05	1.56	0.12	ND	ND	ND
MD: Baltimore	04/01/05	1.57	0.12	ND	ND	ND
ME: Portland	04/27/05	1.63	0.11	ND	ND	ND
MI: Detroit	06/14/05	1.63	0.12	ND	ND	ND
MO: Jefferson City	04/12/05	1.67	0.12	ND	ND	ND
NJ: Trenton	04/15/05	1.56	0.12	ND	ND	ND
NV: Las Vegas	04/12/05	1.56	0.12	ND	ND	ND
NY: Buffalo	04/11/05	1.66	0.13	ND	ND	ND
NY: Syracuse	04/05/05	1.62	0.13	ND	ND	ND
OH: Cincinnati	04/19/05	1.70	0.12	ND	ND	ND
OR: Portland	05/10/05	1.70	0.13	ND	ND	ND
PA: Philadelphia	04/06/05	1.54	0.12	ND	ND	ND
PA: Pittsburgh	04/04/05	1.54	0.12	ND	ND	ND
TN: Chattanooga	04/18/05	1.63	0.11	ND	ND	ND
TN: Knoxville	05/10/05	1.57	0.12	ND	ND	ND
TN: Memphis	05/16/05	1.62	0.13	ND	ND	ND
TX: Ft. Worth	04/18/05	1.67	0.13	ND	ND	ND
TX: San Antonio	04/12/05	1.38	0.12	ND	ND	ND
VT: Montpelier	04/01/05	1.55	0.12	ND	ND	ND
WA: Spokane	04/25/05	1.51	0.13	ND	ND	ND
WA: Tacoma	06/27/05	1.68	0.12	ND	ND	ND
WV: Charleston	04/07/05	1.42	0.12	ND	ND	ND

Note: ND = Not Detected

For More Information

Environmental Radiation Data (ERD) is published quarterly by the U.S. Environmental Protection Agency's Office of Radiation and Indoor Air.

Requests for information concerning the operation of RadNet and the data that are generated should be directed as follows:

For System Operations—

Rhonda Sears
National Air and Radiation Environmental
Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
e-mail: sears.rhonda@epa.gov

For Analytical Information and Data—

John Griggs
National Air and Radiation Environmental
Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
e-mail: griggs.john@epa.gov

Requests for information concerning publication and distribution of ERD should be directed to:

Charles M. Petko
Office of the Director
National Air and Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
e-mail: petko.charles@epa.gov

Requests for information concerning policies of the Office of Radiation and Indoor Air should be directed to:

Bonnie Gitlin
USEPA - ORIA
Radiation Protection Division (MC6608J)
1200 Pennsylvania Ave., NW
Washington, DC 20460
e-mail: gitlin.bonnie@epa.gov

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